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mental material, as those of later times. With very rare exceptions, these primitive conglomerates cannot now be found. And the question is, if they have not been converted into crystalline schists, what has become of them? At the same time, the present condition of such remnants as are left points very strongly to this solution of the problem, and indicates that the first step in the destruction of the conglomerate, as such, has been the distortion of the pebbles.

By these considerations, I am led to the conclusion that the distortion of pebbles, instead of being an exceptional, is probably a very general, phenomenon; and it seems to me likely that, since the formation of conglomerates first began, more pebbles have suffered distortion than have escaped that process.

SOME CHARACTERS USEFUL IN THE STUDY OF THE SPHECIDAE.

By W. H. PATTON.

PELOPOEUS Latr. (1804).

American type: *P. caementarius* (Drury) Smith.

Black, with markings usually of a yellow color. Clypeus bilobed at the apex, rarely entire (more narrowly produced, and the lobes not so distinct in the male). Mandibles of the female broad, armed with a distinct tooth near the apex. Sutures of the meta-episterna distinct. Claws of all the tarsi armed with a short tooth near the middle; two bristles on base of pulvillus, and four above them. Petiole of the abdomen as long as the entire thorax. Cocoons without any layer of white silk, the black plug at the end uncovered.

CHALYBION Dahlb. (1843).

Type: *Chalybion caeruleum*. (*Sphex caerulea* Linn. Syst. Nat., I, 941; *Chalybion cyaneum* Dahlb.)

Blue or violet. Clypeus tridentate at the apex, and in the female sometimes with a small additional tooth at each side. Mandibles of the female slender, of even width throughout, and unarmed (*Ch. caeruleum*); or, short, broad and blunt, and armed with a blunt tooth near the apex (*Ch. Zimmermanni*). Sutures of the meta-episterna indistinct beneath the fovea. Claws of the posterior tarsi unarmed; two bristles on the base of the pulvillus, and six above them. Petiole of the abdomen not so long as the metathorax. Cocoons with a loose exterior layer of white silk, which covers also the black plug at the posterior end of the cocoon. In this genus, as well as in

Pelopoeus, the mandibles of the males are unarmed, slender and acute.

This genus affords an interesting example of the value of color as a generic character. Separated from *Pelopoeus* by Dahlbom in 1843 (*Hymenoptera Europaea*), it was rejected by him two years later in the supplement of the same work, and no characters aside from color were discovered to distinguish it. No subsequent author has discovered additional characters, or has ventured to reestablish the genus. The characters which I have given above, however, prove that the distinct coloration was a sufficient generic indication.

As Dahlbom indicated no type, I select the common American species. In *Ch. caeruleum* ♀ there are two small teeth on the clypeus in addition to the three central ones, the margin of the third ventral segment is sinuate, and there are tomentose spots on the third and fourth ventral segments (Dahlbom stated that these spots were on the second and third segments). *P. californicus* Sauss., said to differ from *caeruleum* in the slightly shorter petiole, I do not consider distinct. I have before me ♂ and ♀ specimens from California which agree in all respects with *Ch. caeruleum*.

Ch. Zimmermanni Dahlb. ♀ differs from *Ch. caeruleum* in the following characters: clypeus tridentate, no side teeth; third ventral segment not sinuate, and the third and fourth without any black sericeous spot; punctures of head and thorax distinct, not confluent, no median elevated line on clypeus or front; no median sulcation on disk of metathorax; face narrower beneath, mandibles broad and blunt, and with a broad and blunt tooth near the apex; mandibles shorter than in either *Ch. caeruleum* or *Pelopoeus*.

To *Chalybion* belong also *Ch. texanum* (*P. texanus* Cress.), and *Ch. aztecum* (*P. aztecus* Sauss.).

CHLORION Latr.

Edge of the clypeus with three teeth in the male, and five teeth in the female. Mandibles armed with a stout tooth in both sexes. Sutures of the meta-episterna distinct. Claws of all the tarsi armed with one tooth. Spines of anterior tarsi of ♀ no longer than the fourth tarsal joint. Labrum short and transverse as in *Chalybion* and *Pelopoeus*.

After carefully studying the arguments given by Westwood, *Trans. Ent. Soc. Lond.*, iii, 227-230 (1840), it remains evident that as Latreille confounded two very distinct genera in his genus *Chlorion*, and as his views as to the type of the genus were originally confused,

the next subsequent author had the right to decide to which section the name should be restricted. It was therefore, proper for Jurine to select *lobata* as the type of *Chlorion* (which he considered to constitute only a section of *Sphex*), and to apply a new generic name, *Ampulex*, to *compressa*. This application of the names *Chlorion* and *Ampulex* is also in conformity with general usage. The ♂ of *Ampulex* has the mandibles armed with a tooth, the mandibles of the female are unarmed.

ISODONTIA¹ n. g.

Type: *Isodontia philadelphica*. (*Sphex philadelphica* Lepel.; *Sphex apicalis* Smith, Cat. Hym. B. M., IV, 262.)

Clypeus of the ♀ with a notch in the middle of the elevated anterior border, and a short tooth on each side of the notch; clypeus of the male simple or with a slight crenulation. Margin of the labrum finely pubescent; labrum of female with a median carina, and armed with two spines or teeth at the apex. Mandibles short, terminated in both sexes by three teeth of equal, or nearly equal length. Marginal cell not extending beyond third submarginal, third submarginal receiving the second recurrent nervure near its base; the second submarginal usually longer than in *Sphex*. Anterior tarsi armed with short spines, not pectinate externally in either sex, the exterior spines being no longer than those within. Tarsal claws bidentate beneath, the outer tooth as large as the inner or larger. Only two bristles between the claws. Petiole of the abdomen more than twice the length of the posterior coxæ, the abdomen narrowed towards the petiole, depressed.

Isodontia philadelphica.

Labrum of female with a slightly incurved spine at the apex on each side of the median carina which is present, the labrum slightly roughened, its border slightly sinuated between the spines; labrum of male rounded anteriorly, without carina and not roughened. Mandibles of female black; of male, varied with ferruginous. Clypeus of female with a broad and slight notch.

Isodontia elegans. *Sphex elegans* Smith., Cat. Hym. B. M., IV, 262, ♂.

Labrum of the female with two short teeth at the apex, from each of which an oblique ridge extends backwards, the median carina

¹ Ἴσος + ὀδους.

distinct, the labrum very slightly roughened, its border slightly sinuated between the teeth; labrum of the male with a more or less distinct median carina, and very slightly roughened, the apex very slightly notched in the middle, but without teeth. Clypeus of female with the notch deep and narrow.

The males of this species often vary in having the tibiæ and last tarsal joint black. The females closely resemble the males.

Isodontia tibialis. *Sphex tibialis* Lepel, Hym., III, 339.

Labrum of female with a sharp median carina, a straight cariniform tooth on each side of it at the apex, and a slightly curved transverse carina just behind them, the border excavated between the teeth. Labrum of male roughened and with a distinct median carina, and a short carina on each side of it at the tip; anterior border rounded. The clypeus of the female with the median notch narrow, and deeper than in *philadelphica*.

Saussure states (Novara Hymenoptera, p. 39), that the petiole of the female of this species, differing from the male, is short as usual in *Sphex*. I judge from this that he has confounded the female of *Sphex flavipes* with the female of *I. tibialis*.

Dahlbom's *Sphex pennsylvanica* is certainly not the Linnean species at present recognized under that name, but appears to be a synonym of *Isodontia tibialis*. Yet, such is the confusion of localities in Dahlbom's work, specimens from the most remote quarters of the globe being referred to the same species, that little confidence can be placed in a synonymical reference when, as in this case, a species is said to occur in Pennsylvania and New Holland. As Dahlbom had only one specimen of his species it is probable that his description relates to some New Holland species which resembles *Isodontia tibialis*.

To *Isodontia* belong also the following species: *I. nigella* (*Sphex nigella* Smith) from China, *I. azteca* (*Sphex azteca* Sauss.) from Mexico, and *I. costipennis* (*Sphex costipennis* Spin.) from South America.

I. azteca differs from the other species, with the possible exception of *costipennis*, in the labrum being entirely smooth and unarmed, and in the mandibles being bidentate in both sexes. But the mandibles are short and the teeth apical as in *Isodontia*, and the anterior tooth in the ♀ is broadly truncate, and evidently corresponds to two of the teeth of *I. philadelphica*. The notch in the clypeus of the ♀ is broad and slight. The petiole is of equal length in the two sexes,

and in its other characters this species agrees generically with *I. philadelphia*.

SPHEX Linn.

(*S. ichneumonia*, *S. pennsylvanica* and *S. flavipes*.)

Clypeus of the female crenate on the margin, or with short, broad teeth; clypeus of the male truncate, the margin crenulate. Labrum of the female with a median carina, the margin finely pubescent, not armed with teeth. Mandibles of the female curved and ending in a long pointed tooth; armed with a large subtriangular tooth within, and this tooth armed at its proximal base with a minute sharp tooth. Mandibles of the male with only one tooth on the inner margin. Marginal cell extending beyond the third submarginal. Claws of the tarsi armed with two teeth at the base beneath, the outer tooth the smaller; only two bristles between the claws. Anterior tarsi of ♀ ciliated externally with long bristles. Petiole of the abdomen no longer than the posterior coxae; abdomen convex, the tip pointed in the female.

Gastrosphaeria Costa, differing from *Sphex* in its "conicogloboso" abdomen and "truncato-concave" tip of antennae, appears to contain our species; but the characters given are not sufficient to establish a distinct genus.

Sphex ichneumonea Linn.

Clypeus of the female with two slight, divergent lobes in the middle of the anterior margin, and a very slight angle just externally to them; clypeus of the male slightly crenulated on the anterior margin. Labrum ferruginous; labrum of the female obtusangular anteriorly and the median carina forming a point at the apex, the median and basal portions of the labrum polished, the lateral and anterior margins marked off by a faint line, and a subtriangular median area marked off by a similar line; in the male this inner area much more distinct, the apex of the labrum obtusangular and rounded, there being no median carina. In the male the apical ventral segments are concave, the fifth, sixth and seventh pubescent, with the pubescence at the sides long; the seventh ventral segment sharply emarginate.

Sphex flavipes Smith.

Clypeus probably as in *ichneumonea*. Labrum of the female as in *ichneumonea*, but, being black or piceous, the delimitations of areas are, as in *pennsylvanica*, not apparent; in the male the labrum,

as in the female, angular anteriorly, the apical half having a median carina which forms a point at the apex, this carina less distinct than in the female, no distinct median area. In the male the apical ventral segments are concave, the fifth, sixth and seventh pubescent, with the pubescence at the sides long; the seventh ventral segment distinctly sinuated.

My ♀ specimen of *flavipes*, from Eastern Tennessee (E. M. Aaron), differs from Smith's description as follows: Length, 21 mm. (not 13 lines); disk of clypeus glabrous, face clothed with a dense brownish pile, and sprinkled with long hairs of the same color; apical margin of labrum not exactly "rounded"; the pubescence of thorax not "golden" but brownish, and on the metathorax white; the tegulae ferruginous (a character not mentioned by Smith); the abdomen not entirely opaque; the apical joint of tarsi and the claws shaded with fuscous. But all these differences excepting the size, the ferruginous tegulae and dark tarsal tips, and possibly the rounded labrum, may be due to this specimen being worn and faded. The color of the tegulae and tips of the tarsi may easily have been overlooked, or may vary.

Two males, received with the female, differ from Smith's description of the female (the male not previously described), as follows: Length, 20 mm; all the pubescence white; tegulae tinged with piceous; apical joint of the tarsi and the claws blackish; wings subhyaline; in one specimen the face golden.

Sphex pennsylvanica Linn.

Clypeus of the female with two obtuse crenations in the middle of the anterior margin, representing the slight lobes of *ichneumonea*; clypeus of the male obtusely crenate on the anterior margin. Labrum of the female slightly rounded anteriorly, the carina not forming a point at the apex, median and basal portion roughened; labrum of the male with the edge nearly straight, the basal and middle portions polished, not roughened, but with no distinct indication of areas. In the male the apical ventral segments are convex; the eighth segment and the sides of the seventh with a dense velvety pubescence; the seventh ventral segment entire, or very slightly sinuate.

HARPACTOPUS Smith.

American type: *H. rufiventris* (Cress.) Patton.

Clypeus in both sexes with a broad sinus on each side, the central portion broadly produced and truncate. Labrum of female

semicircular, truncate at the apex, the truncation bounded by a pair of stout, slightly divergent, truncated processes, the labrum with a broad thickened margin separated by an impressed line; labrum of the male short, evenly rounded anteriorly and unarmed, the epipharynx extending beyond it as a broad membranous margin subangularly rounded at the apex. Labrum in both sexes ciliate with long bristles on each side and without any median carina. Mandibles of the female with two stout teeth on the inner side, the proximal tooth the larger. Mandibles of the male with only one tooth within. Marginal cell not extending beyond third submarginal. Tarsal claws bidentate, second tooth as large as the first or larger; a long curved bristle between the claws in addition to the two smaller and straight ones. Anterior tarsi of the female ciliated externally with long bristles. Petiole a little longer than the posterior coxae; abdomen convex, the tip pointed in the female.

This American group differs in some respects from the Old World group of which the type, *H. crudelis* Sm., is said to have the clypeus notched in the middle of the margin. The characters given above must, therefore, be understood to apply to the American species only. Until the typical form is more carefully described we cannot safely propose a new genus for our species.

PRIONONYX Dahlb.

Type: *P. Thomae* (Fabr.) Dahlb.

Clypeus of the female produced in its whole width; a deep notch in the middle, above which is an elongated depression. Clypeus of the male not so broadly produced, slightly sinuated anteriorly. Labrum of the female narrowed anteriorly and bilobed, the lobes ciliated with long bristles, and separated by a large square sinus; in the median line a short prominent carina which extends as a short tooth into the sinus. Labrum of male narrowed anteriorly, the narrowed portion ciliated with long bristles, the anterior border broadly sinuate, the sinus not ciliated. Mandibles of the female with two teeth on the inner side, the proximal tooth the smaller, yet larger than the corresponding tooth in *Sphex*. Marginal cell not extending beyond the third submarginal. Tarsal claws with five teeth beneath, the outer teeth the largest, the basal tooth very small, but distinct; a long curved bristle between the claws in addition to the two smaller and straight ones. Anterior tarsi of the

female ciliated externally with long bristles. Petiole no longer than the posterior coxae; abdomen convex, the tip pointed in the female.

Both Dahlbom and Smith have described the tarsal claws of *Priononyx* as quadridentate, doubtless overlooking the small basal tooth which is difficult to see unless the claw is detached. This fifth tooth is present in both *thomae* and *atrata*.

In the ♀ of *thomae* the notch in the clypeus is shallow, and above it is a rounded depression. Small specimens of *atrata* approach *thomae* in these respects. In the ♂ of *thomae* the 6th and 7th ventral segments have a deep median sinus on the margin. In *atrata* the margin of these segments is entire.

LIST OF THE NORTH AMERICAN LARRADAE.

BY W. H. PATTON.

SYNOPSIS OF THE GENERA.

- I. Eyes reniform; second submarginal cell petiolate . . . PISON
 II. Eyes entire; second submarginal cell not petiolate.

A. Exterior margin of the mandibles scarcely emarginate.

a. First submarginal cell shorter than the two following taken together, divided by a spurious nervure. Eyes of the ♂ meeting on the vertex. Two spurs on the intermediate tibiae. **ASTATA**

b. First submarginal cell longer than the two following together, not divided. Eyes not meeting on the vertex. Mandibles not dentate within. **LIRIS**

B. Exterior margin of the mandibles with a broad and deep emargination near the base.

a. Three distinct ocelli **LYRODA**

b. Posterior ocelli distorted or obsolete.

1. Metathorax as long as the mesothorax, truncated behind; marginal cell truncate.

LARRA

2. Metathorax shorter than the mesothorax, rounded behind; marginal cell narrow and rounded at the apex. Mandibles dentate within. **TACHYTES**